



1976

Sensory Perceptions of the Resuscitation Recalled by Post Resuscitated Patients in the Post Resuscitation Period

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Recommended Citation

Sutter, Michael James, "Sensory Perceptions of the Resuscitation Recalled by Post Resuscitated Patients in the Post Resuscitation Period" (1976). *Honors Projects*. Paper 37.
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SENSORY PERCEPTIONS
OF THE RESUSCITATION
RECALLED BY POST RESUSCITATED
PATIENTS IN THE POST RESUSCITATION PERIOD

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A Research Project Submitted
in Fulfillment of the Requirements
for Research Honors

ILLINOIS WESLEYAN UNIVERSITY

1976

Accepted by the University and the Department of Nursing
Of Illinois Wesleyan University in Fulfillment of the
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ACKNOWLEDGEMENTS

The writer wishes to thank Dr. Jean Watson, Chairman of his Research Honors Committee, Dr. Mary Shanks, Dr. Karen Gervais, and Dr. David Braught, members of his research honors committee, for their guidance and encouragement provided throughout the course of the project.

In addition, he wishes to thank Mr. Kenneth Huber, administrator at Brokaw Hospital, Mr. Marvin Nickols, administrator at St. Joseph Hospital, Mr. George Hounker, assistant administrator at St. Joseph Hospital, and Mrs. Brew, Director of Nursing Service, at St. James Hospital for their excellent cooperation and interest in the project.

Above all, he wishes to thank his wife, for her patience, love, and encouragement during the project.

M. J. S.

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CHAPTER I

Introduction

"Testimonials of Peace from the 'Dead'" by Dr. Elizabeth Kübler-Ross, described two patients who were considered clinically dead, but through successful resuscitation were brought back to life. As reported by Dr. Kübler-Ross, these resuscitated patients recalled and described actions of the resuscitating team in detail.

Anyone who has participated in a resuscitation must wonder if the patients being resuscitated were aware of the actions of the team during the resuscitation period. Realizing the type of events which take place during a resuscitation, one must shudder at the thought of patients being aware of what is said around them and done to them. It is especially disturbing to note that frequently nurses do not deal with the psychological impact of such an experience especially if patients can recall these events. For example, it might be possible that a patient would experience additional tension and anxiety when recalling his resuscitation, yet he might also be unable to discuss his fears with nursing personnel. The purpose of this study then was to survey and interview selected

post resuscitated patients for any recall of sensory perceptions during their resuscitation. From this purpose arose the statement of the problem.

Problem Statement

The problem of this research was to determine if post resuscitated patients are able to recall their perceptions of sensory stimuli produced during the resuscitation period. It was then necessary to develop several hypotheses for the purpose of studying the acquired data. These hypotheses are as follows:

1. That post resuscitated patients do recall sensory stimuli perceived during the resuscitation period;
2. That post resuscitated patients do recall visual stimuli perceived during the resuscitation period;
3. That post resuscitated patients do recall auditory stimuli perceived during the resuscitation period;
4. That post resuscitated patients do recall tactile stimuli perceived during the resuscitation period;
5. That post resuscitated patients do recall olfactory stimuli perceived during the resuscitation period;
6. That post resuscitated patients do recall oral stimuli perceived during the resuscitation period.

It is essential in the understanding of the hypotheses and problem statement, that certain words be clearly defined.

Definitions

Resuscitation

For the purpose of this study, a resuscitation is any action taken in an attempt to restore the heart beat or rhythm of a patient who had a cardiac arrest. This includes any or all of the following actions: *

1. Cardiopulmonary resuscitation
2. Defibrillation
3. Intubation
4. Administration of medications
5. Other therapeutic measures.

Resuscitation Period

For the purpose of this study, the resuscitation period encompasses the time from when a patient first begins to receive treatment for cardiac arrest or fibrillation to the point when his heart beat has been restored to within satisfactory limits.

Post Resuscitative Patient

For the purpose of this study, the post resuscitative patient is a patient who has been successfully resuscitated, discharged from the hospital in satisfactory condition, and exhibited the ability to adequately complete a questionnaire and interview.

Sensory Stimuli

In this study, sensory stimuli refers to inputs received by the usual five senses of sight, smell, hearing, taste, and

touch. In addition, movement and body position was perceived by means of the tactile sense.

The problem statement, hypotheses and definition was based upon four assumptions.

Assumptions

The following four factors are assumed to be in operation during the resuscitation.

1. That adequate circulation and oxygenation are maintained during the resuscitation;
2. That the brain cells are viable and functionable during the resuscitation due to adequate circulation and oxygenation;
3. That sensory impulses travel via the Spinothalamic tract and the Posterior Columns from the dermatomes to the brain cells;
4. That the brain cells store the sensory impulses that it receives from the thalamus.

Once the assumptions were identified and written, the methodology of the study was conceived.

Methodology

The population for this study consisted of all successfully resuscitated patients who were discharged from the participating hospitals during the calendar year of 1975. These hospitals were

St. Joseph's Hospital in Bloomington, Illinois, Brokaw Hospital in Normal, Illinois, and St. James Hospital in Pontiac, Illinois. Mennonite Hospital in Bloomington, Illinois failed to give the cooperation necessary, and thus was not included in the study.

Selection of the hospitals was based upon easy accessibility for the researcher and interest of the hospitals in the researcher's project. Due to the three month time limitation of the project, hospitals not within geographical availability, a radius of thirty miles, were not asked to participate. Due to their interest and cooperation, St. James Hospital in Pontiac, Illinois, was allowed to participate.

The calendar year of 1975 was chosen in order to keep attrition rate low. Using a longer period of time would have resulted in the possibility of subjects having moved from the area, inability of subjects to remember the events over a longer period of time, or the higher probability of subject being deceased.

Possible subjects were obtained from the resuscitation log books of the consenting hospitals. These log books contained the names of all patients resuscitated, the dates of their resuscitation, and whether or not their resuscitation was successful.

Wanting to maintain the confidentiality of all information, a coronary care nurse from each of the consenting hospitals chose from the log book, names of patients who fulfilled the definition of a post resuscitated patient as stated in the Section of Definitions. This list of names was then sent to the

medical records department for verification that the patient had been discharged. It could occur, and in fact did, that the patient may have died as a result of something other than the initial cause of the resuscitation and thus was not resuscitated again.

The list was further checked with the McLean and Livingston Counties respective Registrars to determine if the subjects were still surviving or if they had expired in another hospital within the county.

In addition, due to the low sample size obtained, patients who had been referred to the researcher were added to the original sample regardless of the date of their resuscitation. One subject was resuscitated in 1974 and lives in Pontiac, Illinois, and another subject, was resuscitated in 1972, lives in Mukilteo, Washington. The only woman participating in the study lives in Normal, Illinois and was resuscitated in 1972. A final referral was a subject who was resuscitated in 1974 and lives in Bloomington, Illinois. This total list comprised the population. Population and sample data is contained in Appendix A.

Two letters were sent to these subjects by the medical records departments of the three hospitals. The first letter, written by the researcher, briefly stated the value of the study and why the hospital chose to participate in the study. The second letter contained a brief summary of the researcher's educational background and stated the purpose of the study. These letters are contained in Appendix B. In addition to these

two letters, a postcard was enclosed which could be returned to the researcher with the subject's name and address, indicating his willingness to participate in the study. All of these materials were enclosed in one envelope and sent out by the respective hospitals.

Upon receiving the return postcard, the researcher contacted the subject by phone and scheduled a time to interview the subject. At that meeting, the subject was asked to fill out a brief, twenty-seven item multiple-choice questionnaire. After completing the questionnaire, the researcher proceeded to interview the subject using a pre-established interview format. At the conclusion of the interview, the subject was allowed to ask the researcher any questions he wished, concerning the study directly or relating to the subject's hospital experience.

It should be stressed that complete confidentiality was maintained at all times. The researcher did not have access to the names or addresses of the participating subjects before the individual subjects returned the postcard. Once the population was selected and the sample obtained, it was necessary to contemplate the possible tools and instruments available for collection of data.

Dr. Elizabeth Kübler-Ross was contacted to determine the type of interviewing techniques and instruments used by her in the article mentioned previously, to obtain information from her patients. She responded that at the present time, no

specific interviewing techniques were being used and that a questionnaire had been used temporarily, but was being analyzed to determine its benefit.

In order to collect the type of information needed, it was decided that a combination of short-answer, "yes-no," and closed ended multiple choice questions would be utilized in one questionnaire. The short-answer questions were necessary to obtain the desired demographic data. Closed ended multiple choice questions were used to determine if any sensory perceptions were recalled for each of the five senses. With the questionnaire being followed by an interview, it was conceivable that the subjects could elaborate upon their initial answers, thus providing additional information.

Review of literature identified no suitable instruments of measurement adaptable for the study, meeting the above mentioned criteria. Therefore, a twenty-seven item questionnaire was developed which would accommodate the purpose of the study. The questionnaire was written and revised until the final form was completed and approved. This final questionnaire was the one which was used in the study and is included in Appendix C.

After a section consisting of four questions for demographic data, seven additional questions were included in order to obtain background data from the patient. The last sixteen questions were concerned with recall of various aspects of the resuscitation period.

There were three possible responses for each of the eighteen

items which would indicate 1) positive certainty, an unquestionable "yes" answer; 2) uncertainty; and 3) negative certainty, an unquestionable "no" answer. The remaining nine questions utilized a variety of responses, such as short answer and "yes-no."

In general, the questionnaire was developed in order to secure the following information:

1. Recall of sensory perceptions before the resuscitation period;
2. Recall of sensory perceptions during the resuscitation period;
3. Recall of sensory perceptions after the resuscitation period;
4. Prior knowledge about resuscitation;
5. Knowledge about resuscitation gained while hospitalized.

A structured interview format was then devised in order to maintain consistency for each subject interviewed. Each subject's response on the questionnaire was reviewed, requesting clarification of their uncertainty or elaboration of their positive and negative certainty. The requests were specific for each response. The interview outline is contained in Appendix D.

CHAPTER II

Review of Literature

An extensive review of the literature revealed only a handful of reports directly related to the ability of post resuscitated patients to recall the resuscitation period. These examples are reported isolated incidents rather than actual research which had been conducted.

One report by Drs. MacMillan and Brown was in a letter to the editor (Canadian Medical Association Journal, 1971) about an eighty-six year old man admitted to the coronary care unit, who ten hours after admission, suffered ventricular fibrillation.¹ The patient was immediately defibrillated, and the convalescence was uneventful. This patient could describe in detail the events surrounding his resuscitation. In this patient's account, as reported by MacMillan and Brown, he felt the actual defibrillation. MacMillan adds to this account that "it is unusual for patients to remember the events surrounding the cardiac arrest. More often there is a period of amnesia of several hours' duration before and after the event."²

¹R.L. MacMillan and W.G. Brown, "Cardiac Arrest Remembered," Canadian Medical Association Journal CIV (May, 1971), p. 889.

²Ibid., p. 890.

Cherkin and Harround, in an article "Anesthesia and Memory Processes" related that memory retention could occur after an operation with pain and sounds being recalled the most often, even though pain was usually the first sensory perception lost in the anesthesia period.³ Furthermore, the auditory perceptions during surgery frequently consisted of remarks which the patient considered frightening. Research in human experimentation yielded evidence that information input may have been partially resistant to light anesthesia, resulting in the subjects having been responsive to "all sensory modalities even though they forgot the sensations after the anesthetic wears off."⁴ In their article, Cherkin and Harround introduced two new terms, "engram" and "mnemon"; engram is defined as "a stable, physical, memory trace in the brain;"⁵ mnemon is defined as "a unit of memory."⁶

To account for responsiveness and auditory memory as mentioned, the authors utilized the two new terms as they related the following hypothesis.

Long term memory is retained in a consolidated 'engram'--a stable physical memory trace in the brain. The growth and decay curves may depend to a great extent on the initial strength of the information input. According to the 'Mnemon' concept, memory is quantal; a weak

³Arthur Cherkin and Phyllis Harround, "Anesthesia and Memory Processes," Anesthesiology XXXIV, 5 (May, 1971), p. 469.

⁴Ibid., p. 471.

⁵Ibid., p. 470.

⁶Ibid.

engram has only a few mnemons, whereas a 'strong' engram has many mnemons. The mnemon concept further postulates that recall is not an all-or-none phenomenon; rather, there is a threshold for recall. Weak engrams have sub-threshold numbers of mnemons and cannot be recalled unless the threshold is lowered, e.g. by hyponosis. . . .successful recall requires that an engram be above threshold. We suggest that the effect of increasing the depth of the anesthesia is to decrease the number of mnemons formed by given information input and thus to decrease the probability of the engram's being above threshold. . . .the net input from a given external stimulus to the memory-processing system is presumably attenuated by anesthesia resulting in the formation of a weak engram which rapidly decays to below the threshold level required for recall.⁷

The authors concluded the article affirming the existence of two major factors that contribute to the probability of amnesia from anesthesia. The factors of uninterrupted "maintenance of anesthesia and absence of auditory input of high emotional content"⁸ should exist to ensure amnesia after anesthesia.

Subjects in "An Electroencephalogram Investigation of Awareness During Anesthesia" (Lewis, Jankinson, and Wilson 1971), without prior medication and in a light plane of anesthesia, listened to prerecorded tapes containing sounds and words. Results indicated that there was no apparent reception of sensory input and no recall or recognition based upon electroencephalograph readings and direct observation. In addition, there was no indication in the verbal account of the proceedings that the subjects were aware of having heard the taped material. Free associations also

⁷Ibid., p. 470-471.

⁸Ibid., p. 472.

did not reveal that the stimulus words on the prerecorded tape had been heard.⁹

This research coincides with the general impression based upon additional reports of awareness during anesthesia. Browne and Catton, in their study of one hundred and twenty patients for awareness during anesthesia, reported that only one patient recalled the start of the operation, with remaining patients having had no recall of events before or immediately after the operation.¹⁰ In a brief article appearing in Lancet the latest information suggests that with standard techniques of anesthesia, "two percent of surgical patients" did recall facts, and "seventeen percent had unpleasant memories, including real pain."¹¹

It is conceivable that the negative results obtained by Lewis et al, were a result of the anesthesia lowering the number of mnemons formed from the input, thus decreasing the probability of the engram formed being above the threshold level. This would follow the hypothesis that Cherkin and Harroun stated previously. However, Lewis et al further states "that there was no alteration in the on going electroencephalogram pattern on visual inspection when the recorded tape was switched on

⁹Stuart A. Lewis, J. Jenkinson, and J. Wilson, "An EEG Investigation of Awareness During Anesthesia," British Journal of Psychology LXIV (August, 1973), p. 414.

¹⁰R.A. Browne and D.V. Catton, "A Study of Awareness During Anesthesia," Anesthesia and Analgesia -- Current Researches LII, 1 (Jan-Feb, 1973), p. 131.

¹¹"Awareness During Anaesthesia," The Lancet (December 8, 1973), p. 1305.

or off.¹² Nonetheless, this could be feasible if the engram formed was of such a nature that it would not alter the electrical activity of the brain enough to stimulate a change on the EEG pattern. It must be kept in mind that the voltages picked up outside the skull in electroencephalography are of a potential of one microvolt even though the actual potential across the membrane of a neuron is approximately one tenth of a volt.¹³

Up to this point, it appears that the amount of anesthesia is the criteria for establishing amnesia, by reduction of the number of mnemons formed, resulting in a weak engram established below threshold level. In addition, the strength of the stimulus and its emotional content are factors in the strength of the engram formed. Anesthesia appears then to not block the neural function completely. Hyposia it seems would not completely account for the inability to recall sensory perceptions.

In an experiment by Crow and Kelman, eighty-six medical students were exposed to various altitudes in a decompression chamber and required to memorize sequences of six digits. Results indicated that the "magnitude of the fall of arterial oxygen tension required to cause a detectable decrement of psychological performance was uncertain."¹⁴ The experiment "failed to reveal

¹²Lewis, Menkinson, and Wilson, p. 414.

¹³Peter M. Milner, Physiological Psychology (New York: Rinehart and Winston, Inc., 1970), p. 50.

¹⁴T.J. Crow and G.R. Kelman, "Effect of Mild Acute Hypoxia on Short-Term Memory," British Journal of Anaesthesia XLIV (June, 1971), p. 548.

any effect of mild hypoxia on learning capacity, as assessed by a test of short-term memory."¹⁵ Additional experimentation was recommended to assess the effect of long-term memory.

However, "Auditory Vigilance Under Hypoxia" by Cahoon reported the results of a two-hour long loudness discrimination task tested under four levels of hypoxia ranging from 10.9% to 21%. Results indicated a substantial decrease in the amount of signal detection as a function of severity of hypoxia and task duration. Cahoon continued that "the major effect of the hypoxia was to decrease the ability of the subject to continuously attend to the stimulus for extended periods of time, possibly by attenuating the intensity of the neural messages that correspond to the signals or by lowering the general arousal level."¹⁶

In a similar study, Cahoon tested the visual vigilance under the same conditions as auditory vigilance. Here also, "as the oxygen level decreased the subject became less and less able to maintain constant attention to the display."¹⁷ He concluded that the effect of hypoxia was not on the ability of the visual system to discriminate a signal from a non-signal, but rather on the ability of the subject to attend to the display.¹⁸

¹⁵Ibid., p. 549.

¹⁶Richard L. Cahoon, "Auditory Vigilance Under Hypoxia," Journal of Applied Psychology LVII, 3 (June, 1973), p. 352.

¹⁷Richard L. Cahoon, "Auditory Vigilance Under Hypoxia," Journal of Applied Psychology LIV (1970), p. 482.

¹⁸Ibid.

While studying "Electroencephalographic Changes in Acute Cerebral Anoxia from Cardiac or Respiratory Arrest," Hockaday et al (1964) stated that "the duration of circulatory occlusion necessary to abolish electrical activity varied from ten seconds to two minutes from one part of the brain to another but was consistent for each, while recovery times followed the same sequence in reverse."¹⁹ He continued by stating "that the interval between onset of ischemia and disappearance of all electrical activity of the brain varies from twelve to sixty seconds. With restoration of blood flow, return of the EEG varied from thirty seconds to four minutes when ischemia was less than seven minutes and up to twenty-five minutes with over eight minutes of ischemia."²⁰ Hockaday also postulated that the diversity and variability of the EEG may be due to the fact that "glycolysis of carbohydrate within the brain in cardiac arrest continues without the availability of oxygen producing severe acidosis from high lactic acid and ammonia levels that is toxic to enzymes within the nerve cells, and the intense swelling and resulting edema complicates seriously recovery when circulation is restored."^{21, 22}

¹⁹Judith M. Hockaday, et al., "Electroencephalographic Changes in Acute Cerebral Anoxia from Cardiac or Respiratory Arrest," Electroencephalography and Clinical Neurophysiology XVIII (1965), p. 575.

²⁰Ibid., p. 576.

²¹Ibid.

²²Ibid., P. 588

Theoretical Basis

Based upon the research studies presented, it was conceivable that successfully resuscitated patients could have recall of sensory perceptions during the resuscitation period. Whether the sensory perceptions existed for recall was dependent upon the strength of the stimulus and the emotional content of that stimulus as perceived by the patient. If the content of the stimulus was of such an emotional nature that the resulting stimulus strength would encompass a substantial number of mnemons, the resulting engram formed would be above the threshold level for recall. The probability exists then, that during the resuscitation period, there are sensory perceptions of a high emotional content, so as to preclude the establishment of a strong engram, resulting in sensory perception recall.

Hypoxia, present during a resuscitation period in varying degrees for fluctuating time decrements, seemed not to have an effect upon the threshold level, nor upon the engram formed. However, it is feasible to assume that the degree of stimulus strength is inversely related to the degree of hypoxia present during the resuscitation. If adequate circulation and oxygenation is present during the resuscitation, little hypoxia should be present. The hypoxia seems to produce an attenuation of the stimulus, by causing the patient to attend less to the stimulus present. This results in a weak engram, due to the low number of mnemons formed, and below the threshold level

for recall. In affect then, hypoxia simulates anesthesia by presumably attenuating the external stimulus. As with the amount of anesthesia, the amount of hypoxia determines whether or not the engram is strong enough to be able to rise above the recall threshold level.

Considering that a wide latitude exists for circumstances surrounding a resuscitation, many factors can influence the amount of hypoxia in the patient, and the emotional nature of the stimulus. Thus, it is possible that there are many other factors that may account for isolated reports of patients who were able to recall their resuscitations in detail. It seems practical to assume that post resuscitated patients may be able to recall sensory perceptions from their resuscitation period based upon the theory presented.

CHAPTER III

Introduction

Past chapters have dealt with the development of the problem statement, formulation of hypotheses, clarification of terms, identification of assumptions and a description of the methodology. In addition, opinions and theoretical concepts of various researchers from a diversity of fields were discussed.

From this, this researcher formulated and conceived a theoretical basis upon which it was feasible to assume that successfully resuscitated patients do have recall of sensory stimuli perceived¹ during the resuscitation period.

In this research study, a descriptive approach to the data was utilized. In addition, due to the low sample size the data obtained was not of a nature to warrant the use of statistical analysis.

The findings reported in this chapter, are broken down into the following categories for easier discussion:

- 1) Demographic data
- 2) Background data

¹In this study perceived is defined as an awareness of, knowledge of, or identification of by means of the senses.

3) Recall of sensory stimuli perceived during the resuscitation

4) Post resuscitated information

Presentation of Data

The sample consisted of a total of seven subjects, one female and six males, with the median age of the subjects being fifty-one years. Questions concerning when the subjects were resuscitated disclosed that two subjects were resuscitated in 1975, three in 1974, and the remaining two subjects resuscitated in 1972. Table #1 summarizes the demographic data obtained from the questionnaire.

TABLE 1
DESCRIPTION OF SUBJECTS
BY SEX, AGE, AND YEAR OF RESUSCITATION

	Subjects						
	#1	#2	#3	#4	#5	#6	#7
Sex	M	M	F	M	M	M	M
Age	48	60	49	49	63	44	44
Year Resuscitated	1975	1975	1972	1972	1974	1974	1974

Background data revealed that three of the seven subjects were patients in the hospital at the time of their arrest.

Subject #2 was admitted for minor surgery, subject #3 for open heart surgery, and subject #7 for chest pain. The other subjects were conscious upon their arrival at the hospital, although one subject recalled blacking out enroute to the hospital but regained consciousness before arriving.

Of the seven subjects, only two had past knowledge of someone who had been resuscitated. Both subjects talked with these individuals after the subjects' resuscitation experience. The remaining five subjects knew of no one who had been resuscitated.

The majority of the subjects, four, did not talk with anyone in the hospital about their experience. Of the three subjects who did discuss their resuscitation experience, all three attempted to talk with their attending physician. The result was, in the subjects' opinions, that the physicians evaded the questions or offered information with little detail. In addition, the same three subjects discussed their resuscitation experience with nurses, who were members of the resuscitation team which had responded to the subject's arrest in two cases. However, only one subject, subject #7, was able to successfully elicit any pertinent information about the resuscitation. Generally speaking, the subjects revealed that the nurses evaded the questions asked concerning the subject's resuscitation, for unknown reasons.

All subjects, except subject #7, noted that none of the nurses initiated any discussion about the subject's resuscitation.

Subject #7 was highly complimentary of the nursing staff in this regard, stating that the nursing staff had openly discussed his resuscitation experience with him. Table #2 summarizes the background data obtained from the questionnaire and interview.

TABLE 2

POSITIVE AND NEGATIVE SUBJECT RESPONSES
TO QUESTIONNAIRE ITEMS #5, #6, #8, AND #9

	Subject Responses	
	Positive Certainty	Negative Certainty
Item #5: Conscious upon arrival	7 ^a	0
Item #6: Know Someone Resuscitated	2	5
Item #8: Talked with anyone in hospital about the resuscitation	3	4
Item #9: Nurses Discuss resuscitation	1	6 ^b

^aChange to positive certainty on interview from negative certainty or uncertainty. (One subject only)

^bTwo subjects change to negative certainty on interview from positive certainty or uncertainty.

Three subjects attempted to ask the nurses questions concerning the events surrounding the resuscitation; however, only one subject was able to obtain any information about the

experience from them. Four subjects gave the following reasons for not asking the nurses questions: 1) they felt that the nurses would not feel comfortable in answering the questions; 2) they felt that the nurses would not have access to the knowledge or information requested; and 3) they believed that the nurses were under the physician's orders not to release any information.

Of the seven subjects, only two witnessed other resuscitations while hospitalized. Both of them stated that this experience increased their anxiety and fear. One of these subjects was transferred out of the Coronary Care Unit as a result. Neither subject indicated if any personnel talked with them about this witnessed resuscitation.

The next set of questions elicited information concerning how the patients felt just prior to their arrest. This was done in order for the researcher to be able to discriminate between sensations noticed before their arrest and during the resuscitation. The possibility could exist that the subjects would be unable to discriminate between these two periods, thus attributing perceived sensory stimuli to the time of the resuscitation, when in fact it occurred temporally prior to the resuscitation. Patients were also asked how they felt just after the resuscitation.

Six of the seven subjects were able to recall how they felt just prior to the arrest. For some, this period just prior to the arrest, extended up to thirty minutes. A variety of responses were obtained from the six subjects who responded

with positive certainty to the question. Three subjects reported experiencing shortness of breath of a "strangling" feeling. One subject experienced chest pain and nausea along with the shortness of breath. Another subject reported only a feeling of discomfort, with no other symptomatology noted. Angina attacks and dizziness were reported by another subject, although he reported experiencing no pain at the time he arrived at the hospital. Two subjects reported experiencing no pain or discomfort, although one noted minor shortness of breath.

Whether or not the subjects had any recall of sensory stimuli produced and perceived during the resuscitation was determined by a series of eight questions dispersed throughout the questionnaire.

Auditory stimuli were perceived by five subjects, either immediately after the arrest but before the resuscitation was started or during the resuscitation. One subject was unable to precisely discriminate during which period she perceived the auditory stimuli, but is positive that she heard the physician say that if she lived, she would probably be a vegetable. The remaining subjects did not recall any auditory stimuli during these defined periods of time. Discounting the one subject previously mentioned, three subjects recalled perceiving auditory stimuli immediately after the arrest but before the actual start of the resuscitation. In addition, three subjects, one subject not included in the above group,

were able to perceive auditory stimuli during the resuscitation.

Of those subjects who perceived some type of auditory stimuli during the resuscitation, four subjects heard statements which would be considered to be of a high emotional nature. In addition, subjects were specific about the statements they heard after the arrest but before the resuscitation. Subjects who perceived statements during the arrest, were not as specific about what they had heard, nor could they relate in detail the types of auditory stimuli perceived.

One subject reported that before the start of the resuscitation, he heard the physician say that he needed help because the paddles on the defibrillator were not functioning properly. During the resuscitation, this subject heard some "voices" but could not describe what was being said, nor who was speaking. Another subject heard someone say that his denture plate should be taken out, but recalled no auditory stimuli during the resuscitation. The last subject perceiving auditory stimuli before the start of the resuscitation but after the arrest, reported hearing the "code-blue" call over the intercom, as well as the physician saying that he could not detect a pulse or blood pressure. This subject, during the resuscitation heard the physician call for some sort of a catheter, but could not provide a more detailed description of it or its purpose. One subject reported hearing someone screaming during the resuscitation, but could not recall who. This subject recalled perceiving no auditory stimuli during

the period occurring after the arrest but before the resuscitation.

The next sense to be reviewed was the tactile sense. It should be recalled from the terms defined in the section entitled, "Definitions," the tactile sense includes sensations of movement in addition to the normal sensation of touch.

Two subjects indicated recalling perceptions of tactile stimuli during the resuscitation. One subject recalled someone pounding on his chest and the physician cutting his arm for some reason. Another subject recalled his dentures being removed. Four subjects had no recall of such stimuli and the remaining subject was uncertain, even upon questioning. As to the perception of movement, only one subject responded with positive certainty which was clarified during the interview. He reported recalling being turned on his side during the resuscitation. The remaining six subjects had no recall of any sensory stimuli involving movement, although several subjects assumed that they had to be touched and moved in some manner during the resuscitation. However, they had no actual awareness of such tactile sensations and thus responded with negative certainty on the questionnaire in regards to these questions.

As with a previous question, it was necessary to determine if the subjects were able to discriminate between tactile perceptions occurring during the resuscitation and tactile perceptions noticed after the restoration of the heart beat.

Only one subject was able to recall any tactile perceptions immediately after the restoration of his heart beat. However, the types of stimuli this subject related after the restoration of his heart beat were of a different nature than those he recalled as perceived during the resuscitation. During the resuscitation, he remembered someone pounding on his chest and the physician cutting his arm while after the resuscitation, he was aware of being moved down the hall way. Thus, it is feasible to assume that this subject probably discriminated between the two periods mentioned.

Only two of the seven subjects recalled any visual stimuli which were observed during the resuscitation. The remaining five subjects recalled no visual perceptions at any time during the resuscitation. Both subjects responding with positive certainty, saw people as well as light and color. One subject actually saw the physician place the paddles from the defibrillator on his chest. He relates that to this day, he is unable to view any scene which demonstrates or illustrates this event. The other subject exhibits a textbook picture. He was able to visualize the whole resuscitation from a perspective other than that of being on the emergency room table. He felt he was looking at the events from an elevated view, like standing aloft. The setting from which he viewed the resuscitation was peaceful and calm, not as hectic as the resuscitation environment. Although the scene was blurry, he was able to make out individuals, see lights, and the actual events.

Olfactory and gustatory stimuli were not perceived by any of the seven subjects involved in the study. Data revealed all seven subjects responded with negative certainty to all questions involving these two senses. The interview seemed to affirm the negative certainty of the subjects regarding these two senses.

Based upon responses from the questionnaire and the interview, all subjects responded that both their heart beat and breathing had stopped. It was not determined from whom or by what means, the subjects obtained this information.

Thus, in conclusion, Table #3 summarizes the data obtained from the questionnaire and interview in regards to perceptions of sensory stimuli during the resuscitation being recalled.

TABLE 3
 TYPES OF SENSORY STIMULI PERCEIVED
 BY SUBJECTS WITH POSITIVE OR NEGATIVE CERTAINTY

Type of Sensory Stimuli	Number of Subjects Responses	
	Positive Certainty	Negative Certainty
Olfactory	0	7 ^b
Gustatory	0	7 ^b
Tactile: Touch	2 ^{a,c}	4 ^{a,c}
Sense of Movement (During)	1 ^a	6 ^b
Sense of Movement (After)	1	6 ^b
Visual: Light or Color	2	5
Movement or People	2	5 ^b
Auditory: During the Resuscitation	4 ^a	3 ^b
After Arrest; Before Resuscitation	4	3

^aOne subject changed to positive certainty on interview from negative certainty or uncertainty.

^bTwo subjects changed to negative certainty on interview from positive certainty or uncertainty.

^cOne subject remained uncertain after interview.

CHAPTER IV

Conclusions

The purpose of the project was to determine if selected post resuscitated patients had any recall of sensory perceptions during their resuscitation. Thus, a twenty-seven item questionnaire was submitted to seven subjects (post resuscitated) who volunteered to participate in the research project. A follow up interview was also conducted. Based upon the research studies presented together with the theory developed by the researcher, it was conceivable that successfully resuscitated patients could have recall of sensory perceptions during the resuscitation period.

Based upon the data collected and responses disclosed, several hypotheses were supported. These hypotheses were:

- 1) That post resuscitated patients do recall stimuli perceived during the resuscitation period;
- 2) That post resuscitated patients do recall visual stimuli perceived during the resuscitation period;
- 3) That post resuscitated patients do recall auditory stimuli perceived during the resuscitation period;
- 4) That post resuscitated patients do recall tactile stimuli perceived during the resuscitation period.

The following hypotheses were not supported based upon the data collected:

- 1) That post resuscitated patients do recall olfactory stimuli perceived during the resuscitation period;
- 2) That post resuscitated patients do recall gustatory stimuli perceived during the resuscitation period.

Supported by the data presented, it was found that there was recall of sensory stimuli perceived for three of the five senses at some time during the resuscitation or immediately prior to the start of the resuscitation. Only gustatory and olfactory senses produced negative results from all subjects involved. It is undetermined but may be possible that these senses required a larger area of the cerebral cortex for information storage which was not available at the time.

The remaining three senses--auditory, visual, and tactile--appeared to be intact and functioning. In reviewing the data, one might hypothesize why some individuals are able to perceive these sensory stimuli and others are not.

As mentioned previously, the emotional nature or content of the sensory stimulus perceived, contributes to the strength of the engram formed by creating a large number of mnemons. In addition, the strength of the engram is dependent upon the degree of hypoxia present, hypoxia being inversely related to the degree of stimulus strength. As related in the section entitled, "Theoretical Basis," hypoxia produces an attenuation of the stimulus, by causing the patient to attend less to the

stimulus present, the end result being a low number of mnemons formed, resulting in a weak engram formed below the threshold level for recall. Thus the combination of the degree of hypoxia and the emotional content of the stimulus as perceived by the patient either produces a synergistic or antagonistic effect, depending upon a variety of influences at the time. What one individual considers emotional in nature, another may take for granted. Based upon the data presented it is observed that the type of stimuli perceived by the subjects indicating positive certainty to auditory, visual, and tactile senses were of a nature to regard them as of a highly emotional nature, resulting in a strong engram; thus the ability of the subjects to recall the sensory perceptions.

As the data disclosed, several senses were not perceived at all, some senses were perceived only by two subjects, and others were perceived by a simple majority of subjects. Several factors were presented as to the causative relationship. In summary, these factors are:

- 1) The degree of hypoxia present;
- 2) The emotional content or nature of the stimulus perceived;
 - a) Influenced by the personnel participating in the resuscitation; and
 - b) Influenced by the personality of the individual being resuscitated;

- 3) The strength of the engram formed, based upon the degree of hypoxia and the emotional nature of the stimulus;
- 4) The strength of the stimulus and the number of mnemons created;
- 5) Ability of the subject to attend to the stimulus;
- 6) The area of the cerebral cortex needed to store the engram formed; and
- 7) The degree of disturbance of the micro-circulation within the vascular system, especially the cerebral cortex.

Thus it may be the presence or lack of any of the above factors in combination which might have accounted for the inability of some subjects to recall any sensory perceptions, whereas other subjects were able to recall sensory stimuli from several senses.

As to the variability of detail presented by subjects concerning the different senses, it is conceivable the answer lies in Guyton's Textbook of Medical Physiology. Guyton stated "that the cerebral cortex is not required for perception of sensation, but it does add immeasurably to its depth of meaning."¹ Thus as the degree of hypoxia increases, a larger

¹Arthur C. Guyton, Textbook of Medical Physiology, 4th ed. (Philadelphia: W.B. Saunders Company, 1971), p. 544.

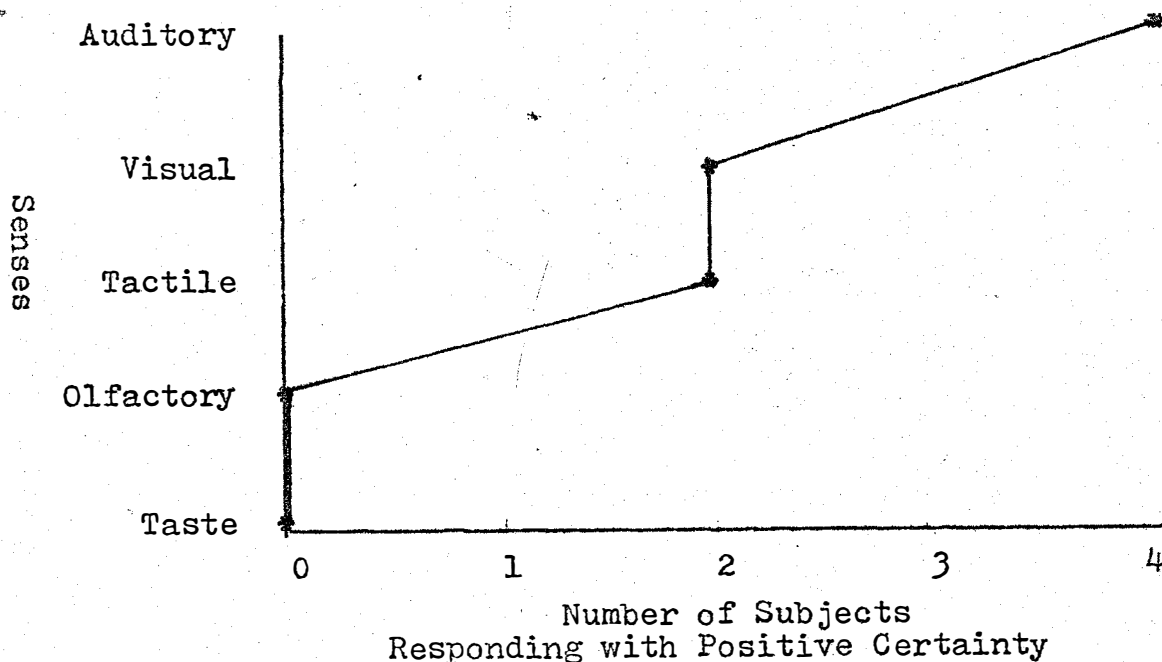
area of the cerebral cortex may cease to function. Hence, the subject is able to recall a stimulus perception, but is unable to attach a specific meaning to this perception. This decreases the number of mnemons available from which the engram is formed. As a result, the formulated engram is strong enough to be stored, but not of sufficient strength to store the details surrounding the stimulus perception. For example, the data presented demonstrated that the subjects were able to recall greater detail during the period which existed immediately after the arrest but before the start of the resuscitation, compared to the period existing during the resuscitation. Despite adequate circulation and oxygenation maintained during the resuscitation, disturbances in the micro-circulation probably results in certain areas of the cerebral cortex becoming hypoxic, resulting in the phenomenon presented by the data obtained.

Thus, it can only be established that certain post resuscitated patients are able to recall perceptions of sensory stimuli in various detail during the resuscitation. As to which sense perception will be recalled, and in what detail, there is variation from subject to subject as the data presented previously reveals.

However, on that note, an interesting figure is obtained from the data.

FIGURE 1

NUMBER OF SUBJECTS WITH POSITIVE
RECALL OF SENSORY STIMULI PERCEIVED DURING THE RESUSCITATION



This figure illustrates that the probability may exist of a linear relationship among the five senses. At this time, no cause was investigated which might support the information presented in the figure.

Implications of the Study

From the data presented and the discussion of its analysis, post resuscitated patients did recall sensory stimuli perceived during the resuscitation period. Interviews conducted with each subject established that some perceptions recalled resulted in increased anxiety and stress. Citing an example of one subject who recalled the physician saying that she would be a vegetable,

it was obtained from the interview that she was fearful of having brain damage. While hospitalized, she refused to divulge to the medical personnel certain symptoms she was having, for fear these symptoms would result in the staff labeling her mentally ill as a result of the brain damage.

Past research indicated stress and fear of this type, which resulted in an increased heart rate, blood pressure and increased secretion of hormones. Obviously, a cardiac patient does not need additional strain placed on the heart during his or her recovery phase.

Thus, since post resuscitated patients can recall sensory perceptions during the resuscitation, it is the function of the nurse to allay the anxiety, stress, or fear these perceptions may cause. This function of dealing with the psychological impact of such sensory perceptions should receive a high priority in nursing care rendered. Obviously, not all post resuscitated patients actively recall previously mentioned anxiety producing sensory perceptions. Through adequate nursing assessment of the total person, nurses have the ability to determine what type of discussion is needed to alleviate the anxiety which may or may not be present. Communication is a large part of the nursing process and it is necessary to involve the patient in order to accomplish predetermined goals. Nurses must talk with the patient, explain procedures, and answer questions which the patient may have. Physicians must be willing to delegate to nurses responsibility to provide in-

formation sought by the patient surrounding the resuscitation. Rendering patient care is a team approach.

In addition, members of the resuscitation team should be cautious as to what is discussed in front of the patient during the resuscitation. However, since resuscitations tend to increase tension among even the most efficient resuscitation team, this recommendation will be difficult to enforce. Nonetheless, unnecessary information not relevant to the resuscitation should be kept to a minimum. For example, whether a patient will become a vegetable or not is not immediately predictable, or if it is, it should not be discussed within the patient's auditory range.

During training procedures for resuscitation teams or for nursing students, it should be emphasized that patients during the resuscitation have the ability to perceive sensory stimuli which can be recalled in the post resuscitation period. In addition, nurses can remind the team that some patients have sensory perception during the resuscitation. So it becomes the function of the coronary care or intensive care nurse to deal with the effects of what the post resuscitated patient perceives during his or her recovery phase in the unit.

Recommendations for Further Research

Although seven subjects produced positive results, a larger sample size could be used for statistical analysis. Thus future studies should consider selecting a larger sample size.

In some cases, three years had elapsed between the subject's resuscitation and the conducting of the interview. It is feasible that other factors influenced the data obtained from the subject due to this time span involved. Another procedure method would be to conduct the investigation at periods of six and twelve months after the resuscitation.

In addition, it was impossible to verify the information obtained from each of the subjects. Thus information obtained from the questionnaire and the interview was assumed to be accurate as the patient recalled it. Because of the time span cited, and the time limitations of this research, members of the resuscitation team who treated the subjects in the sample were not interviewed. This would have aided in validating the information obtained from the subjects participating in the study. One method to eliminate this problem would be for the individual or individuals conducting the interview to be present at the resuscitation with a check list. Thus, a record of events as they actually occurred could be written. A comparison between the information obtained during the interview and that obtained during the resuscitation could be made.

Combining the above mentioned recommendations would result in securing more consistent results as well as eliciting more specific details.

Research should also be done to determine the actual effects of such sensory recall. It might be possible that other subjects were reassured to know that the resuscitation team was efficient and performed their functions quickly and effectively as possible.

These recommendations are made with the understanding that further research conducted in this area will bring to light new information about the psychological impact, and about the sensory perceptions recalled, of post resuscitated patients. The resulting effect could produce insights and new knowledge in the nursing care of the post resuscitated patient.

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APPENDIX A
TOTAL POPULATION AND SAMPLE

	BROKAW HOSPITAL	ST. JAMES HOSPITAL	ST. JOSEPH HOSPITAL	OTHER	TOTAL
Resuscitations during 1975	33	31	30	0	94
Successful Resuscitations for 1975	10	11	3	0	24
Patients still surviving	6	4	3	0	13
Subjects interviewed	2	1	0	4	7

TOTAL POPULATION AND SAMPLE

APPENDIX B

**LETTERS SENT TO THE SUBJECTS BY THE
MEDICAL RECORDS DEPARTMENTS OF THE PARTICIPATING HOSPITALS**

Illinois Wesleyan University

P. O. Box 2900

Bloomington, Illinois 61701

School of Nursing

February 14, 1976

Dear Patron:

Currently, I am an Illinois Wesleyan University, majoring in nursing and working on my research honor's project. Although a Bloomington native for the past twenty-five years, my situation is somewhat unusual, in that I am a male in what is usually considered a female profession, and I possess a Bachelor's degree in Chemistry.

Regardless of a researcher's background, no project is complete without the assistance of past patients. People say, "How can I be of any help?" Let me assure you that no research project is complete without a large amount of information gathered from those people most able to supply that information.

You have been selected as a possible participant by the hospital, due to a unique experience that not all people have had. Because of this unique experience, you are able to contribute valuable information to my research project. As you know from the letter sent to you by the hospital, I have no way of contacting you. You must indicate a willingness to help me in my research project by filling out the enclosed card. Due to the limited number of individuals with your unique experience, I urge you to return the enclosed card. When I receive your name and phone number, I will arrange an interview at your earliest convenience, and will also supply a short questionnaire for you to answer.

I look forward to hearing from you, and am

Respectfully yours,

Michael J. Sutter

February 14, 1976

Dear _____,

As our former patient you are a member of a unique group, a group of patients who have been successfully resuscitated. Since there are an increasing number of patients who will share your experience, it is important that we in the medical profession seek to maintain the best possible nursing care for those patients undergoing that experience. As a renderer of health service to the community, _____ Hospital is interested in supporting all responsible efforts to seek new knowledge and insights into this aspect of patient care.

It is for this reason that _____ Hospital has consented to participate in a research project conducted by Mr. Michael Sutter an Illinois Wesleyan University Senior Nursing Major. Since patients would be particularly valuable in this type of study, the hospital has chosen you as a possible participant in Mr. Sutter's study. The hospital wishes to stress that all information will remain confidential throughout the study. In fact, the hospital has not, and will not release your name and address to Mr. Sutter, without your written consent. Should you be willing to participate in the study, return the enclosed card to him, including that information which will enable him to contact you.

Obviously, the decision to participate is up to you. However, if we did not feel that there would be potential value resulting from the study, we would neither have endorsed the project, nor have consented to participate in the manner that we are by making this initial contact with you. We recommend that you read the letter of introduction from Mr. Sutter, then make your decision. Should you desire clarification of any matter mentioned in this letter or any of the enclosed materials, please call my office.

Sincerely yours,

Administrator
_____ Hospital

APPENDIX C
RESUSCITATION QUESTIONNAIRE

RESUSCITATION QUESTIONNAIRE

1. NAME: _____
2. AGE: _____
3. DATE ADMITTED TO THE HOSPITAL: _____
4. DATE DISCHARGED FROM THE HOSPITAL: _____

The following questions have been developed in order to obtain information for the study. Please read the questions carefully and ask the interviewer for clarification about any question you do not understand. Place an "X" before the statement that best applies to you.

5. Were you conscious upon your arrival to the hospital?
 - A. _____ Yes, I am certain that I was conscious.
 - B. _____ I am uncertain if I was conscious or not.
 - C. _____ No, I am sure I was not conscious.
6. Do you know someone who has been resuscitated?
 - A. _____ Yes
 - B. _____ No
7. If the answer to Question #6 is "yes", have you talked with this person?
 - A. _____ Yes
 - B. _____ No
8. Did you talk with anyone in the hospital about your resuscitation?
 - A. _____ Yes, I did.
 - B. _____ I do not remember.
 - C. _____ No, I did not.
9. In the hospital, did any nurses discuss your resuscitation with you?
 - A. _____ Yes, they did.
 - B. _____ I do not remember for sure.
 - C. _____ No, they did not.
10. While hospitalized, did you ask the nurses any questions about your resuscitation?
 - A. _____ Yes, I did.
 - B. _____ I do not remember for sure.
 - C. _____ No, I did not.
11. Did you ever observe any other patients being resuscitated?
 - A. _____ Yes, I did.
 - B. _____ I do not remember for sure.
 - C. _____ No, I did not.

12. Do you know how you felt just prior to the alteration in your heart beat?
- A. ☐ Yes, I know how I felt.
B. ☐ I am uncertain how I felt.
C. ☐ No, I do not know how I felt.
13. Do you know how you felt just prior to the alteration in your breathing?
- A. ☐ Yes, I know how I felt.
B. ☐ I do not remember for sure.
C. ☐ No, I do not know how I felt.
14. Did you hear anything immediately after the arrest but before the resuscitation?
- A. ☐ Yes, I heard something.
B. ☐ I am uncertain if I heard anything.
C. ☐ No, I did not hear anything.
15. Did you hear anything during the resuscitation?
- A. ☐ Yes, I heard something.
B. ☐ I am uncertain if I heard anything.
C. ☐ No, I did not hear anything.
16. Were you touched in any manner during the resuscitation?
- A. ☐ Yes, I was touched.
B. ☐ I am uncertain if I was touched.
C. ☐ No, I was not touched.
17. Did you taste anything familiar or unusual during the resuscitation?
- A. ☐ Yes, I tasted something.
B. ☐ I am uncertain if I tasted something.
C. ☐ No, I did not taste anything.
18. Do you know how you felt after your heart beat and breathing had been restored?
- A. ☐ Yes, I know how I felt.
B. ☐ I am uncertain how I felt.
C. ☐ No, I do not know how I felt.
19. Were you aware of the passing of time during the arrest and resuscitation?
- A. ☐ Yes, I was aware of it.
B. ☐ I am uncertain if I was aware.
C. ☐ No, I was not aware of it.
20. If the answer to Question #19 is "yes", please state how long you think this period lasted?

21. Did you see any light or color during the resuscitation?
- A. ☐ Yes, I saw something.
B. ☐ I am uncertain if I saw anything.
C. ☐ No, I did not see anything.
22. Did you see any people or movement during the resuscitation?
- A. ☐ Yes, I saw something.
B. ☐ I am uncertain if I saw anything.
C. ☐ No, I did not see anything.
23. Did you smell anything familiar or strange during the resuscitation?
- A. ☐ Yes, I smelled something.
B. ☐ I am uncertain if I smelled anything.
C. ☐ No, I did not smell anything.
24. Do you know if you were moved or lifted during the resuscitation?
- A. ☐ Yes, I know.
B. ☐ I am uncertain.
C. ☐ No, I do not know.
25. Do you know if you were moved after your heart beat and breathing had been restored?
- A. ☐ Yes, I know.
B. ☐ I am uncertain.
C. ☐ No, I do not know.
26. What is the first thing you remember after your heart beat and breathing had been restored?
27. Please check the following statements as they apply.
- ☐ My heart arrested.
☐ My breathing stopped.
☐ My heart and breathing stopped.

APPENDIX D
INTERVIEW FORMAT

INTERVIEW FORMAT

I. Question #1 - #4

A. Self-explanatory, no follow up needed

II. Question #5

A. If either A, B, or C is answered

1. Could you please elaborate on that for me?

III. Question #6

1. Self-Explanatory, no follow up needed

IV. Question #7

A. Did you talk with this person before or after your resuscitation?

B. What relation is this person to you?

C. Could you relate what you discussed?

D. Did you gain new information from having talked with this person?

V. Question #8

A. If A is Answered

1. With whom did you talk?

2. Had this person experienced a resuscitation?

3. Could you relate what you talked about?

4. Did you obtain new information?

B. If B is answered:

1. You stated you do not remember for sure. Let me ask, did you have any questions about your resuscitation?
2. With whom or from whom, did you obtain your answers to your questions?

C. If C is answered:

1. Let me see now, you discussed with on one your resuscitation?
2. Did you mentioned your resuscitation with your physician?
3. Vice versa of 2.
4. If a "yes" answer is given to B or C, proceed to questions under A.

VI. Question #9

A. If A is answered:

1. Could you related what you talked about?
2. Who first approached the subject?
3. How did you feel after the conversation, compared to before the conversation?

B. If B is answered:

1. Follow questions listed for V-B

C. If C is answered:

1. None of the nurses discussed your resuscitation with you?

VII. Question #10

A. If A is answered

1. Could you relate the questions you asked?
2. What type of answers did you receive?
3. Were the answers satisfactory?
4. What prompted you to ask those questions?

5. Did the nurses appear willing to answer the questions?

B. If B is answered:

1. According to the questionnaire, your not sure you asked the nurses any questions?
2. Do you recall having any questions you would have wanted answered?

C. If C is answered:

1. You stated you did not ask the nurses any questions at the time, could you possible recall why you did not? (e.g. were you comfortable in asking the questions?)

VIII. Question #11

A. If A is answered:

1. Under what circumstances did you observe the resuscitation?
2. How did you feel at this time?
3. Did you know the patient?
4. Could you relate what you observed?

B. If B is answered:

1. According to the questionnaire your not sure if you observed a resuscitation, could you explain why you feel uncertain?

C. If C is answered:

1. You observed no resuscitation during your stay in the hospital?
2. Were you aware of any that may have occurred?

IX. Question #12

A. If A is answered:

1. Could you describe how you felt?
(e.g. tired, pain, SOB, faint, warm, etc.)
2. How long did this feeling last?

3. Did this feeling seem to change during that period?

B. If B is answered:

1. Could you explain why you feel uncertain?

C. If C is answered:

1. According to the questionnaire, you did not know how you felt just prior to the alteration in your heart beat?

X. Question #13

A. Follow same line of questioning as in IX-A

B. Follow same line of questioning as in IX-B

C. Follow same line of questioning as in IX-C

XI. Question #14

A. If A is answered

1. Could you describe what you heard?

2. How long did this sound last?

3. Do you know what may have caused this sound?

B. If B is answered

1. Could you tell me why you are not sure if you heard anything?

2. (e.g. of sounds: bell, ringing, pop, voices)

C. If C is answered

1. According to the questionnaire you did not hear anything?

XII. Question #15

A. If A is answered, follow questioning in XI-A

B. If B is answered, follow questioning in XI-B

C. If C is answered, follow questioning in XI-C

XIII. Question #16

A. If A is answered:

1. Could you describe what you felt?
2. What may have caused this feeling?
3. How long did this feeling last?

B. If B is answered:

1. Could you explain your uncertainty?
2. (e.g. of feelings, warm, cold, cutting, stinging)

C. If C is answered:

1. According to the questionnaire you were not touched during the resuscitation?

XIV. Question #17:

A. If A is answered:

1. Could you describe what you tasted?
2. Do you know what may have caused this taste?
3. How long did this taste last?

B. If B is answered:

1. Could you explain why you are uncertain?
2. (e.g. of tastes, sour, bitter, sweet)

C. If C is answered:

1. According to the questionnaire you did not taste anything during the resuscitation?

XV. Question #18

A. If A is answered:

1. Could you describe how you felt?
2. How long did this feeling last?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you do not know how you felt after your heart beat and breathing had been restored?

XVI. Question #19

A. If A is answered:

1. Could you explain what this period was like?

XVII. Question #20

A. self-explanatory, no follow up needed

XVIII. Question #21

A. If A is answered:

1. Could you describe what you saw?

2. How long did this last?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you saw nothing during the resuscitation?

XIV. Question #22:

A. If A is answered:

1. Could you describe who or what you saw?

2. What was this person doing?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you saw no people or movement during the resuscitation?

XX. Question #23

A. If A is answered

1. Could you describe what you smelled?
2. How long did this smell last?
3. Do you know what may have caused this smell?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you smelled nothing during the resuscitation?

XXI. Question #24

A. If A is answered:

1. Could you explain the sensation you experienced?
2. Do you know what may have caused this sensation?
3. Do you know why you were moved or lifted?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you do not know if you were moved or lifted during the resuscitation?

XXII. Question #25

A. If A is answered:

1. Could you explain the sensation you experienced?
2. Do you know what may have caused this sensation?
3. Do you know why you were moved?

B. If B is answered:

1. Could you explain why you are uncertain?

C. If C is answered:

1. According to the questionnaire you were not moved after your resuscitation?

XXIII. Question #26

A. Self-explanatory, no follow up necessary

XXIV. Is there anything else you would like to tell me that has not been covered?

XXV. Are there any questions you would like to ask me about the study or your resuscitation?